Part 1
System Outline

What is in this part? This part contains the following chapters:

Chapter	See page
1–General Outline: Altherma	1–3
2–Specifications	1–15
3–Functional Diagrams	1–21
4–Piping Diagrams	1–27
5–Switch Box Layout	1–33
6–Wiring Diagrams	1–39
7–PCB Layout	1–51

1

1 General Outline: Altherma

1.1 What Is in This Chapter?

Introduction

This chapter contains the following information on the Altherma:

- ➤ Outlook and dimensions
- ➤ Installation and service space
- ➤ Componentss
- ➤ Physical limitations and limits of operation

General outline

This chapter contains the following general outlines:

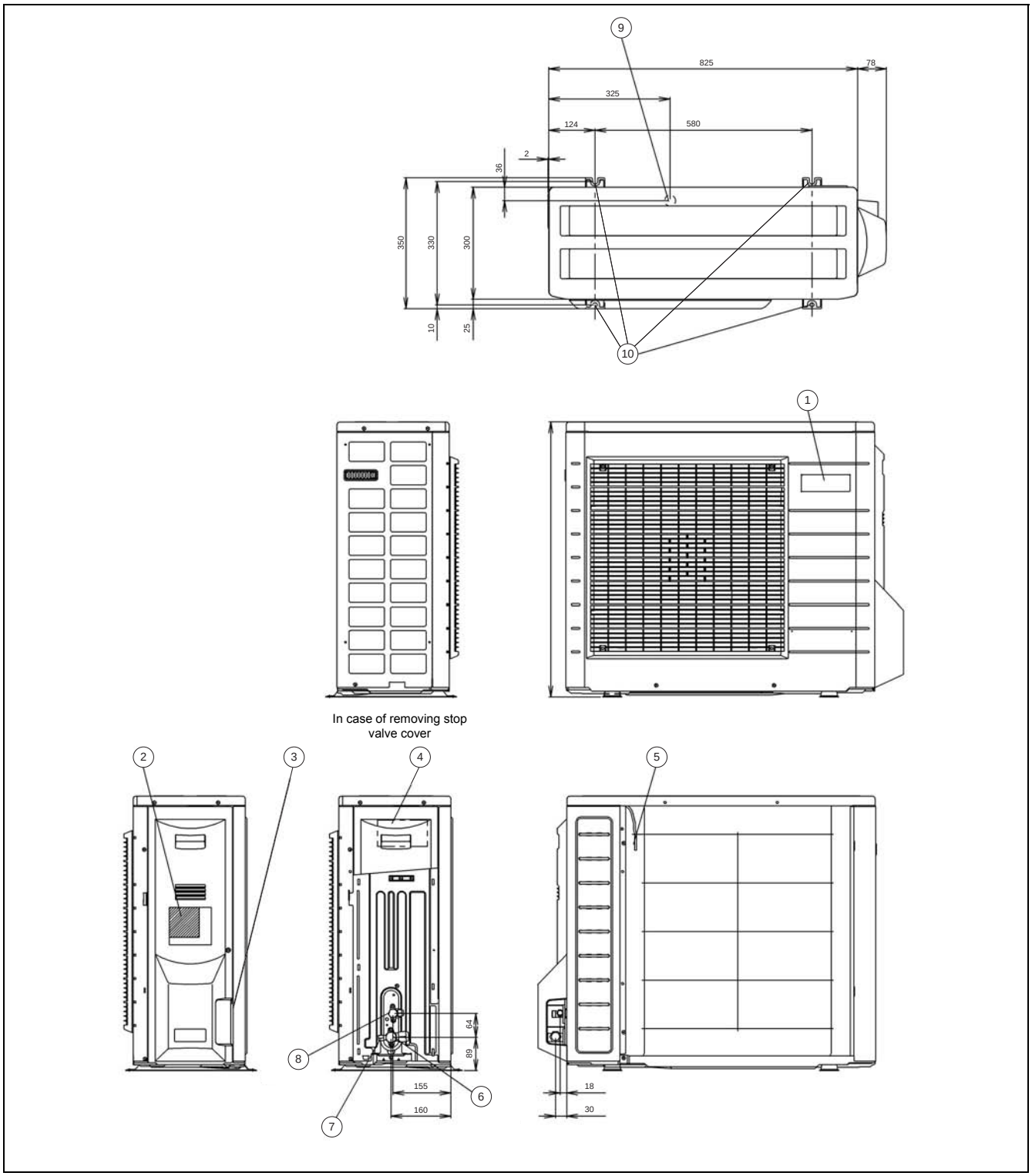
General outline	See page
1.2–ERYQ005~007AAV3N: Outlook and Dimensions	1–4
1.3–EKHBH007A***: Outlook and Dimensions	1–6
1.4–EKHBX007A***: Outlook and Dimensions	1–8
1.5–EKSWW150~300V3: Outlook and Dimensions - Service Space	1–10
1.6–ERYQ005~007AAV3N: Installation and Service Space	1–12
1.7–EKHBH(X)007A: Installation and Service Space	1–12
1.8–Physical Limitations and Limits of Operation	1–14

1

1.2 ERYQ005~007AAV3N: Outlook and Dimensions

Outlook and dimensions

The illustration below shows the outlook and the dimensions of the unit (mm).



Installation and service space

See page 1–12.

Components

The table below contains the different components of the unit.

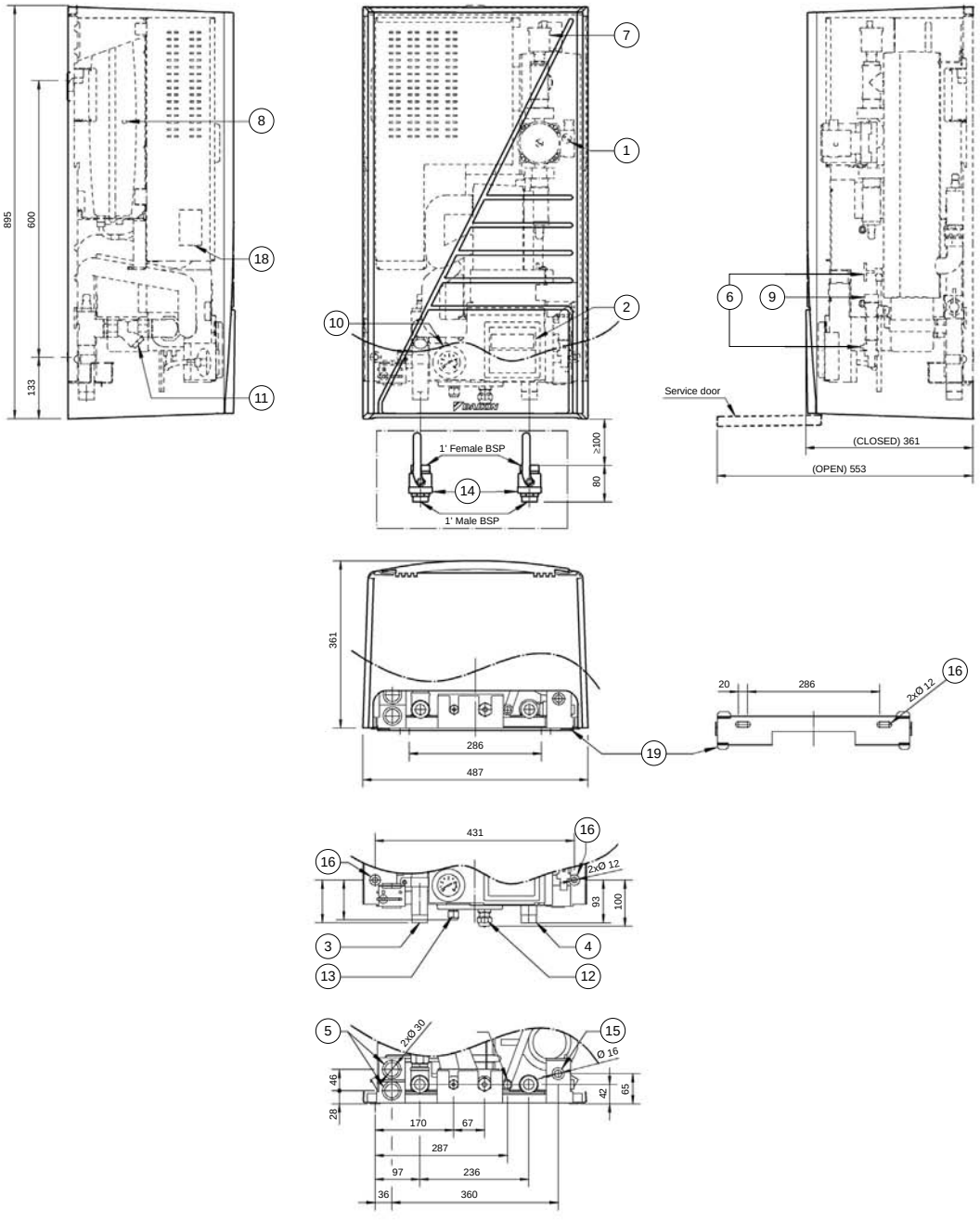
No.	Component
1	Brand name label
2	Name plate
3	Wiring inlet
4	Terminal strip with earth terminal
5	Outdoor air temperature thermistor
6	Gas stop valve (ϕ15.9CuT)
7	Service port
8	Liquid stop valve (ϕ6.4CuT)
9	Drain outlet (I.D. ϕ15.9 hose for connection)
10	4-holes for anchor bolts (M8 or M10)

1

1.3 EKHBH007A***: Outlook and Dimensions

Outlook and dimensions

The illustration below shows the outlook and the dimensions of the unit (mm).



Installation and service space

See page 1–13.

Components

The table below contains the different components of the unit.

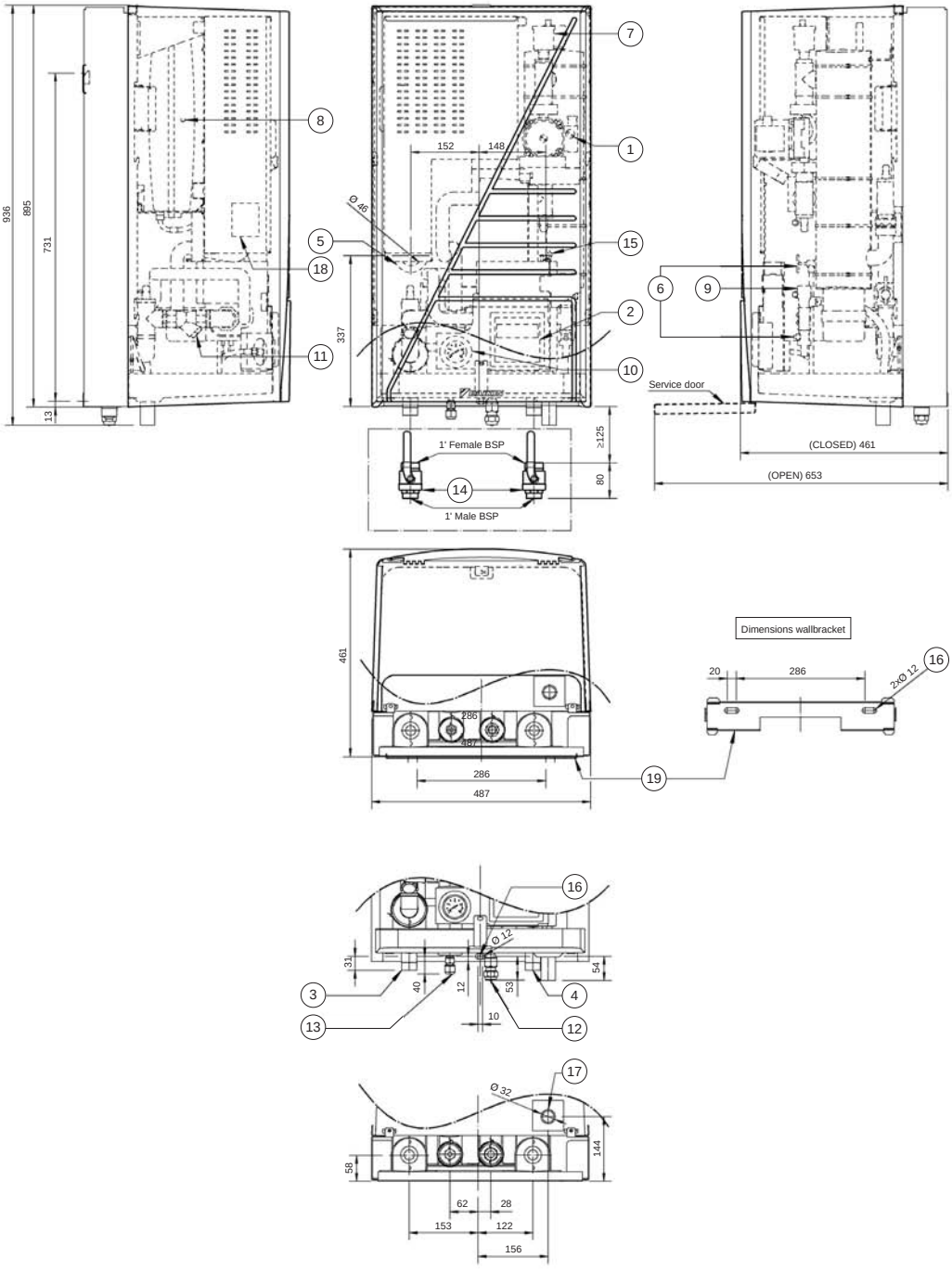
No.	Component
1	Pump + switch for speed setting
2	Remocon
3	Water IN connection 1e M BSP
4	Water OUT connection 1e M BSP
5	Power supply intake (+ sanitary warm water tank)
6	Drain/fill valve
7	Air purge
8	Expansion vessel + nipple
9	Blow off valve
10	Pressure gauge
11	Waterfilter
12	Suction pipe connection ϕ15.9 flare connection
13	Liquid pipe connection ϕ9.52 flare connection
14	Shut off valves (delivered with unit)
15	Thermistor connection (+ sanitary warm water tank)
16	Holes for fixation
17	Blow off drain
18	Switchbox connection terminals
19	Wallbracket

1

1.4 EKHBX007A***: Outlook and Dimensions

Outlook and dimensions

The illustration below shows the outlook and the dimensions of the unit (mm).



Installation and service space

See page 1–13.

Components

The table below contains the different components of the unit.

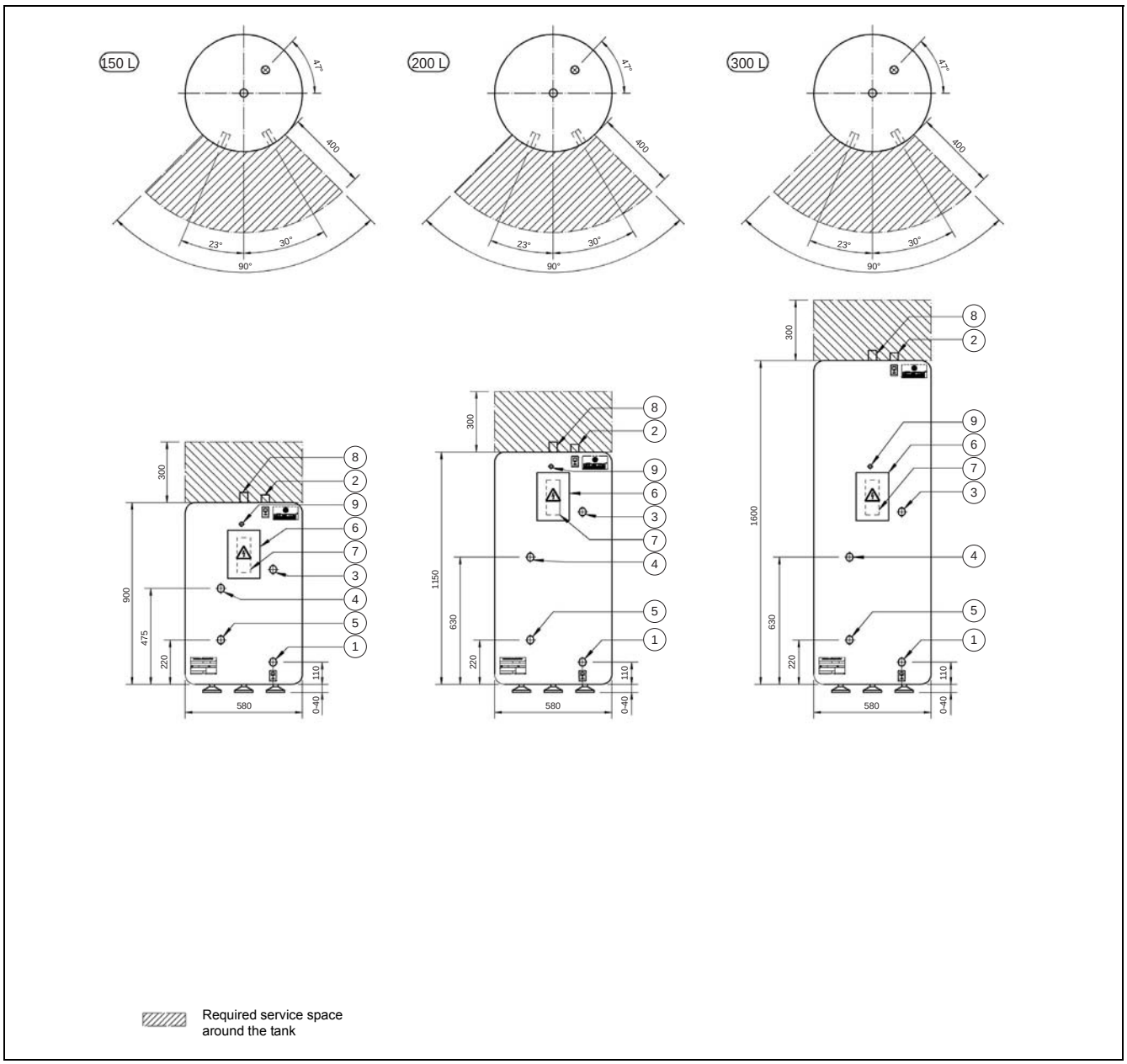
No.	Component
1	Pump + switch for speed setting
2	Remocon
3	Water IN connection 1e M BSP
4	Water OUT connection 1e M BSP
5	Power supply intake (+ sanitary warm water tank)
6	Drain/fill valve
7	Air purge
8	Expansion vessel + nipple
9	Blow off valve
10	Pressure gauge
11	Waterfilter
12	Suction pipe connection ϕ15.9 flare connection
13	Liquid pipe connection ϕ9.52 flare connection
14	Shut off valves (delivered with unit)
15	Thermistor connection (+ sanitary warm water tank)
16	Holes for fixation
17	Blow off drain
18	Switchbox connection terminals
19	Wallbracket

1

1.5 EKSWW150~300V3: Outlook and Dimensions - Service Space

Outlook and dimensions - Service space

The illustration below shows the outlook and the dimensions of the unit (mm).



Components

The table below contains the different components of the unit.

No.	Component
1	Water mains IN female 3/4’ BSP
2	Water mains OUT female 3/4’ BSP
3	Thermistor connection female 1/2’ BSP
4	Flow (from Hydro-box) female 3/4’ BSP
5	Return (to Hydro-box) female 3/4’ BSP
6	Switchbox
7	Clixon
8	Connection female 1/2’ BSP
9	Power entrance

1

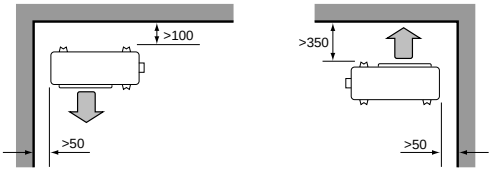
1.6 ERYQ005~007AAV3N: Installation and Service Space

Installing near a wall or obstacle

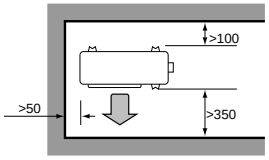
- ➤ Where a wall or other obstacle is in the path of the outdoor unit air intake or exhaust airflow, follow the installation guidelines below.
- ➤ For any of the installation patterns below, the wall height on the exhaust side should be 1200 mm or less.

Wall facing one side (unit: mm)

Walls facing two sides (unit: mm)



Walls facing three sides (unit: mm)



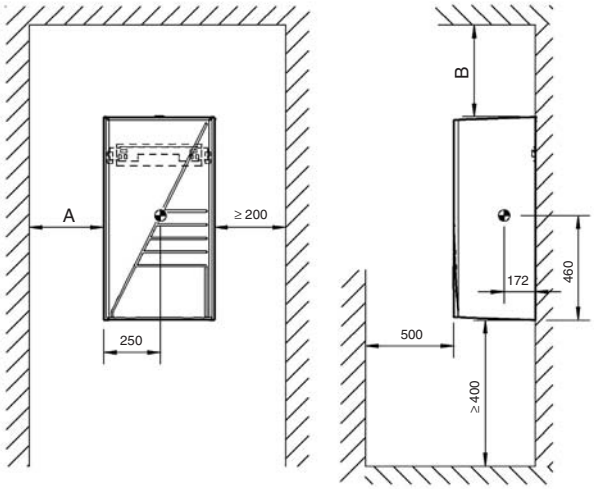
Remark:

- ➤ Back to back: 300 mm
- ➤ Front to front: 5000 mm

1.7 EKHBH(X)007A: Installation and Service Space

EKHBH

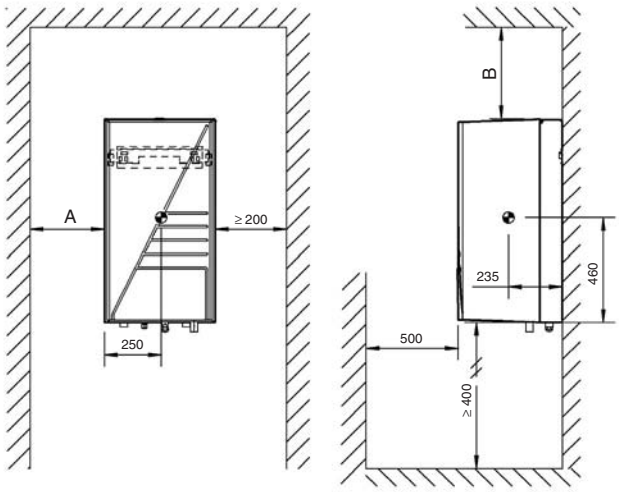
The illustration below shows the minimum service space for service and ventilation.



	A	B
Setup 1	≥ 200	≥ 400
Setup 2	≥ 350	≥ 200

EKHBX

The illustration below shows the minimum service space for service and ventilation.



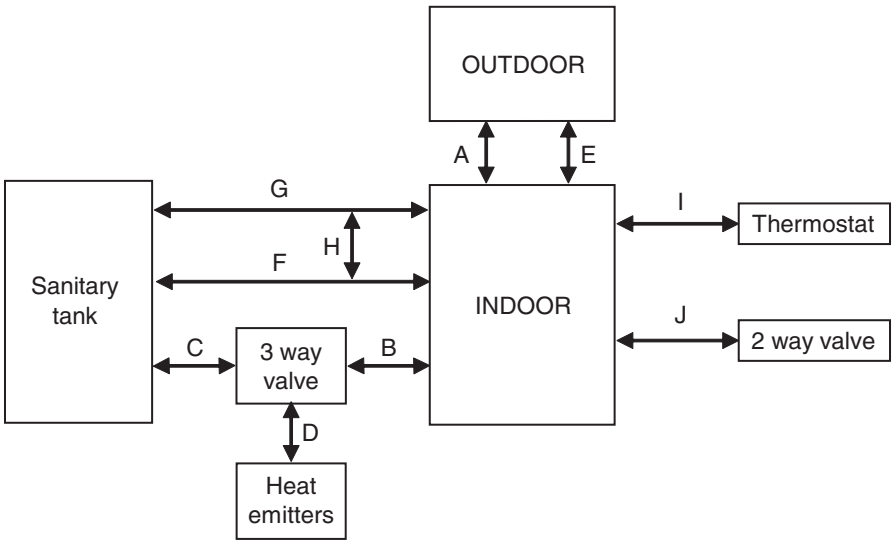
	A	B
Setup 1	≥ 200	≥ 400
Setup 2	≥ 350	≥ 200

1

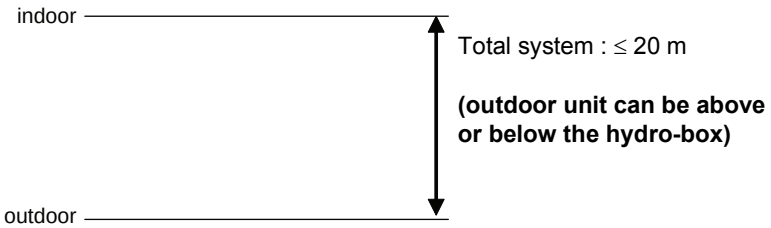
1.8 Physical Limitations and Limits of Operation

Distance between components

The illustrations and table below show the limitations.



Allowable heigth:



	Piping R410A	Piping water			Power supply		Communication			
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
ERYQ005ABV3	3 < **A** ≤ 30m	≤ 3 m	≤ 10 m	depend on instal-lation	depend on instal-lation	depend on instal-lation	12 m	> 0.05 m	depend on instal-lation	depend on instal-lation
ERYQ006ABV3										
ERYQ007ABV3										

Remark

E: 123-wiring in/outdoor
F: Power supply booster + Q2L safety
G: Thermistor cable supplied with the sanitary tanks is 12 m in length. May not be changed!

2 Specifications

2.1 What Is in This Chapter?

Introduction

This chapter contains the following information:

- ➤ Technical specifications
- ➤ Electrical specifications

Altherma

This chapter contains the following specifications:

Specifications	See page
2.2–ERYQ005~007	1–16
2.3–EKHBH and EKHBX	1–18
2.4–EKSWW150~300V3/Z2	1–20

1

2.2 ERYQ005~007

Technical specifications

The table below contains the technical specifications.

Specification			ERYQ005~007
Casing	Colour		Ivory white
	Material		Polyester painted galvanised steel
Dimensions	Packing	Height	797 mm
		Width	960 mm
		Depth	390 mm
	Unit	Height	735 mm
		Width	825 mm
		Depth	300 mm
Weight	Machine weight		56 kg
	Gross weight		61 kg
Packing	Material		EPS, CARTON
	Weight		5 kg
Heat exchanger	Specifications	Length	845 mm
		Nr. of rows	2
		Fin pitch	1.8 mm
		Nr. of passes	—
		Face area	—
		Nr. of stages	32 m²
	Tube type		Hi-Xa(8)
	Fin	Type	WF fin
		Treatment	Anti-corrosion treatment (PE)
Fan	Type		Propeller
	Discharge direction		Horizontal
	Quantity		1
	Air flow rate (nominal at 230 V)	Heating high	—
		Heating low	—
		Cooling high	—
		Cooling low	—
	Motor	Quantity	1
		Output	53 W
Compressor	Quantity		1
	Motor	Model	2YC63BXD#C
		Type	Hermetically sealed swing compressor
		Output	1920 W
Operation range (see Altherma operation manual)	Heating	Min.	-20°C DB
		Max.	25°C DB
	Cooling	Min.	7°C WB
		Max.	20°C WB
	Sanitary water	Min.	-20°C DB
		Max.	43°C DB
Sound level (nominal)	Heating	Sound power (5/6/7)	64/64/66 dBA
		Sound pressure (5/6/7)	48/48/52 dBA
	Cooling	Sound power	63/64/66 dBA
		Sound pressure (5/6/7)	47/47/53 dBA
Sound level (night quiet)	Sound pressure		—
Refrigerant	Type		R410A
	Charge		1.7 kg
	Control		Expansion valve (electronic type)
	Nr. of circuits		1

Specification			ERYQ005~007
Refrigerant oil	Type		FVC50K
	Charged volume		0.75 l
Piping connections	Liquid	Type	Flare connection
		Diameter (OD)	6.35 mm
	Gas	Type	Flare connection
		Diameter (OD)	15.9 mm
	Drain	Quantity	1
		Type	Socket
		Diameter (OD)	18 mm
	Piping length	Min.	3 m
		Max.	30 m
		Equivalent	—
		Chargeless	—
	Additional refrigerant charge		0.02 lF > 10 m
	Installation height difference max.		15 m
	Max. interunit level difference		20 m
Defrost method			Reverse cycle
Defrost control			Sensor for outdoor heat exchanger temperature
Capacity control method			Inverter controlled
Standard accessories	Item		Installation manual, drain plug
	Quantity		1

Electrical specifications

The table below contains the electrical specifications.

Specification			ERYQ00
Power supply	Name		V1
	Phase		1
	Frequency		50 Hz
	Voltage		220 V-240 V
	Voltage range	Minimum	-10% (V)
		Maximum	+10% (V)
Current	Nominal running current	Cooling	—
		Heating	—
	Starting current	Cooling	11 A
		Heating	11 A
	Maximum running current	Cooling	16.25 A
		Heating	18 A
	Recommended fuses		20 A
Wire connections	For power supply	Quantity	3
		Remark	—
	For connection with hydro-box	Quantity	4
		Remark	Included earth wiring

1

2.3 EKHBH and EKHBX

Technical specifications

The table below contains the technical specifications.

Specification			EKHBH*			EKHBX*		
			EKHBH007A*	EKHBH007A*	EKHBH007A*	EKHBX007*	EKHBX007*	EKHBX007*
Outdoor units			ERYQ005A	ERYQ006A	ERYQ007A	ERYQ005A	ERYQ006A	ERYQ007A
Nominal input (indoor only without electric heater)			230 W					
Casing	Colour		RAL9010					
	Material		Epoxy polyester painted galvanised steel					
Dimensions	Packing	Height	1225 mm					
		Width	660 mm					
		Depth	595 mm					
	Unit	Height	895 mm			936 mm		
		Width	487 mm			487 mm		
		Depth	361 mm			461 mm		
Weight	Machine weigth		55 kg			65 kg		
	Gross weight		65 kg			75 kg		
Packing	Material		EPS/Wood/Carton/PS (straps)					
	Weight		10 kg			10 kg		
Main components	Pump	Type	Water cooled					
		Nr. of speed	3					
		Nominal ESP unit Cooling	—	—	—	49.9 kPa	46.5 kPa	44.4 kPa
		Nominal ESP unit Heating	46.5 kPa	40.1 kPa	29.0 kPa	46.5 kPa	40.1 kPa	29.0 kPa
		Power input	130 W					
	Water side Heat exchanger	Type	Brazed plate					
		Quantity	1					
		Water volume	0.67 l					
		Water flow rate Min.	12 l/min	12 l/min	12 l/min	12 l/min	12 l/min	12 l/min
		Water flow rate Nom. Cooling	—	—	—	14.7 l/min	16.5 l/min	17.6 l/min
		Water flow rate Nom. Heating	16.5 l/min	19.6 l/min	24.2 l/min	16.5 l/min	19.6 l/min	24.2 l/min
		Water flow rate Max. Cooling	—	—	—	—	—	—
		Water flow rate Max. Heating	—	—	—	—	—	—
		Insulation material	Polyurethane foam					
	Expansion vessel	Volume	10 l					
		Max. water pressure	3 bar					
		Pre-pressure	1 bar					
	Water filter	Diameter perforations	1 mm					
		Material	Brass					
Water circuit	Piping connections diameter		1” MBSP					
	Piping		1” MBSP					
	Safety valve		3					
	Manometer		Yes					
	Drain valve/Fill valve		Yes					
	Shut off valve		Yes					
	Air purge valve		Yes					
Refrigerant ciruit	Gas side diameter		15.9 mm					
	Liquid side diameter		(2)					
Sound level	Sound pressure		27 dBA					
	Sound power		—					
Operation range	Waterside	Cooling	7~20°C					
		Heating	30~55°C					

Notes:
1. The sound pressure level is measured via a microphone at a certain distance from the unit. It is a relative value, depending on the distance and acoustic environment:
2. (2):
   - ➤ ERYQ-models: 6.35 mm
   - ➤ EKHB-models: 9.52 mm (flare connection)

Electrical specifications

The table below contains the electrical specifications.

Specification				EKHBH*			EKHBX*		
				EKHBH007A*	EKHBH007A*	EKHBH007A*	EKHBX007*	EKHBX007*	EKHBX007*
Outdoor units				ERYQ005A	ERYQ006A	ERYQ007A	ERYQ005A	ERYQ006A	ERYQ007A
Electric heater	Type			3V3	6V3	6W1	6T1	9W1	9T1
	Power supply	Phase		1~	1~	3N~	3~	3N~	3~
		Frequency		50 Hz					
		Voltage		230 V	230 V	400 V	230 V	400 V	230 V
	Current	Running current		13 A	26 A	8.6 A	15 A	13 A	23 A
		Zmax.	List	No requirements	—	No requirements	Out of scoop	No requirements	Out of scoop
			Text	—	0.25 + j0.15	—	—	—	—
		Zmax. electric heater + booster heater (EKSWW* models)	List	—	—	No requirements	Out of scoop	No requirements	Out of scoop
			Text	0.25 + j0.15	0.17 + j0.10	—	—	—	—

Notes:
1. Electric heater has 2 capacity steps except for the 3V3 model which has only 1 capacity step.

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2.4 EKSWW150~300V3/Z2

Technical specifications

The table below contains the technical specifications.

Specification			EKSWW150V3	EKSWW200V3	EKSWW300V3	EKSWW200Z2	EKSWW300Z2
Casing	Colour		Neutral white				
	Material		Epoxy-coated mild steel				
Dimensions	Packing	Height	950 mm	1200 mm	1650 mm	1200 mm	1650 mm
		Width	600 mm				
		Depth	600 mm				
	Unit	Height	900 mm	1150 mm	1600 mm	1150 mm	1600 mm
		Width	580 mm				
		Depth	580 mm				
Weight	Machine weigth		37 kg	45 kg	59 kg	45 kg	59 kg
	Gross weight		40 kg	49 kg	64 kg	49 kg	64 kg
Packing	Material		EPS/Carton				
	Weight		3 kg	4 kg	5 kg	4 kg	5 kg
Main components	Tank	Water volume	150 l	200 l	300 l	200 l	300 l
		Material	Stainless steel (DIN 1.4521)				
		Max. temperature	85°C				
		Max. water pressure	10 bar				
		Insulation Material	Polyurethane foam				
		Insulation Min. thickness	40 mm				
	Heat exchanger	Quantity	1				
		Material	Stainless steel (DIN 1.4401)				
	Booster heater	Quantity	1				
		Capacity	3 kW				
Temperature sensor	Cable length		12 m				
Piping connections	Water inlet H/E Diameter		3/4” FBSP (inch)				
	Water outlet H/E Diameter		3/4” FBSP (inch)				
	Cold water in Diameter		3/4” FBSP (inch)				
	Hot water out Diameter		3/4” FBSP (inch)				

Electrical specifications

The table below contains the electrical specifications.

Specification			EKSWW150V3	EKSWW200V3	EKSWW300V3	EKSWW200Z2	EKSWW300Z2
Unit	Power supply	Phase	1~			2~	
		Frequency	50 Hz				
		Voltage	230 V			400 V	
	Nominal running current		13 A			7.5 A	
	Fuse	Size	20 A				
		Phase	1~			2~	

3 Functional Diagrams

3.1 What Is in This Chapter?

Introduction

This chapter contains the following information:

- ➤ Overview complete system
- ➤ Electrical connection diagram
- ➤ Pipe connection diameters.

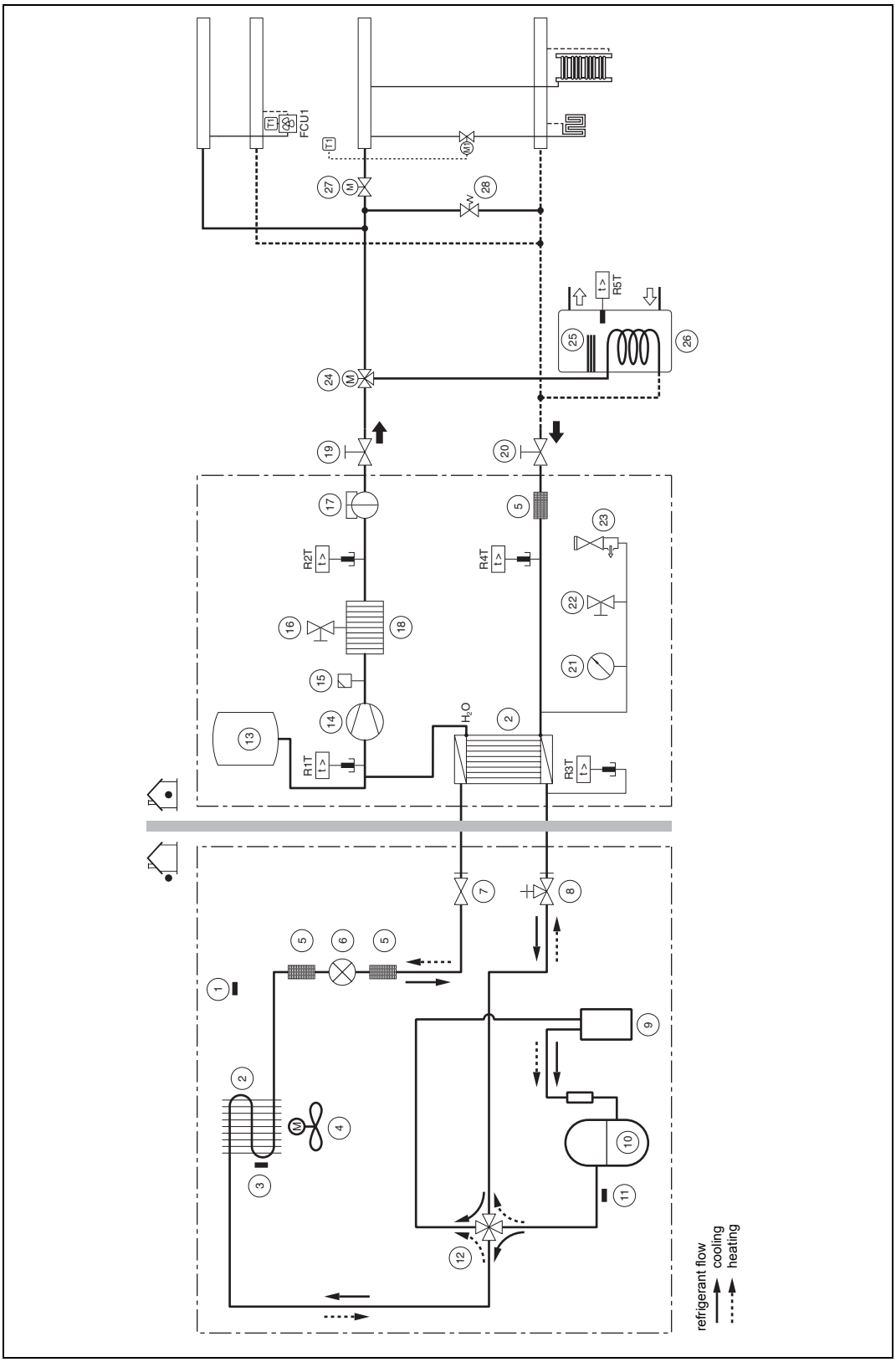
Functional diagrams

This chapter contains the following functional diagrams:

Functional diagram	See page
3.2–Complete System	1–22
3.3–Electrical Connection Diagram	1–24
3.4–Pipe Connection Diameters	1–25

1

3.2 Complete System



Components

The table below contains the different components of the functional diagrams.

No.	Name
1	Outdoor air temperature thermistor
2	Heat exchanger
3	Heat exchanger thermistor
4	Propeller fan
5	Filter
6	Expansion valve
7	Liquid stop valve
8	Gas stop valve with service port
9	Accumulator
10	Compressor
11	Discharge pipe thermistor
12	4-way valve ON: heating
13	Expansion vessel
14	Pump
15	Air purge valve
16	Drain valve
17	Flow switch
18	Backup heater
19	Outlet
20	Inlet
21	Manometer
22	Fill and drain valve
23	Pressure relief valve
24	3-way valve for sanitary water tank
25	Booster heater
26	SWW tank
27	2-way valve for cooling mode
28	By-pass valve
R1T	Outlet water Heatexchanger thermistor
R2T	Outlet water Backup heater thermistor
R3T	Refrigerant water thermistor
R4T	Inlet water thermistor
R5T	Sanitary water tank thermistor

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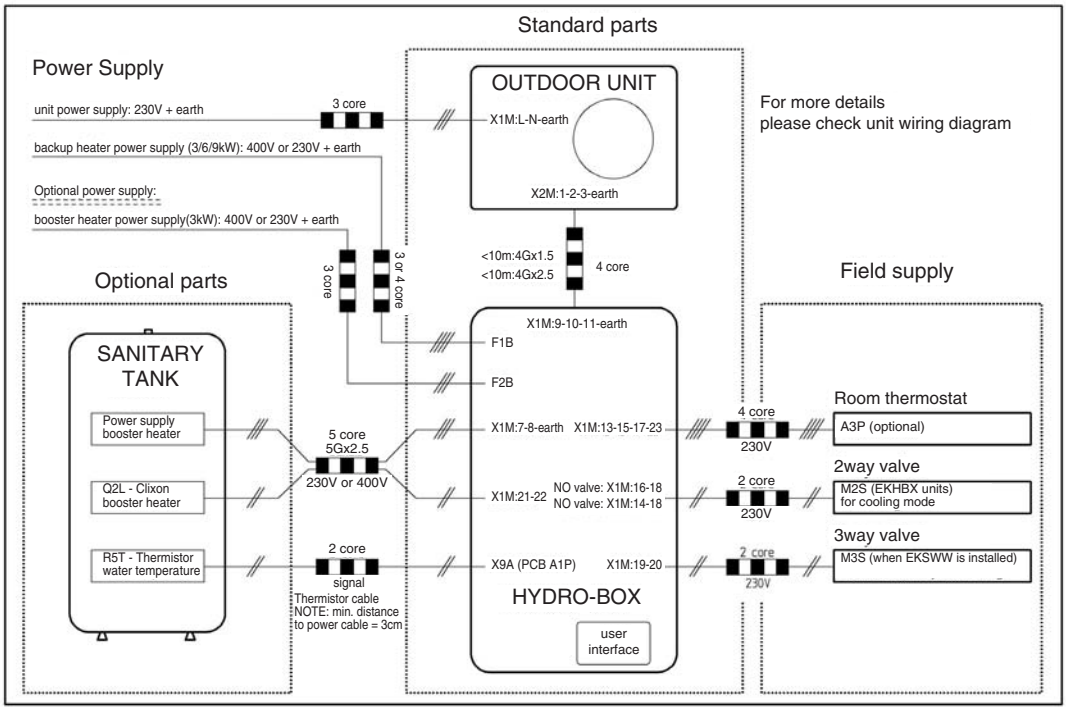
3.3 Electrical Connection Diagram



3.4 Pipe Connection Diameters

Outdoor units

The table below contains the refrigerant pipe connection diameters.

Model	∅ Gas pipe (flare)	∅ Liquid pipe (flare)
ERYQ005ABV3	15.9 mm	6.4 mm
ERYQ006ABV3		
ERYQ007ABV3		

Hydro-box

The table below contains the refrigerant pipe connection diameters.

Model	∅ Gas pipe (flare)	∅ Liquid pipe (flare)
EKHBH007A	15.9 mm	6.4 mm
EKHBX007A		

Hydro-box + water side

The table below contains the water inlet/outlet connection diameters.

Model	∅ Gas pipe (flare)	∅ Liquid pipe (flare)
EKHBH007A	1 inch (MBSP)[1]	1 inch (MBSP)
EKHBX007A		
EKSWW150	3/4 inch (FBSP)[2]	3/4 inch (FBSP)
EKSWW200		
EKSWW300		

1: MBSP = male British standard pipe

2: FBSP = female British standard pipe

1

4 Piping Diagrams

4.1 What Is in This Chapter?

Introduction

This chapter contains the following information:

- ➤ Piping diagrams

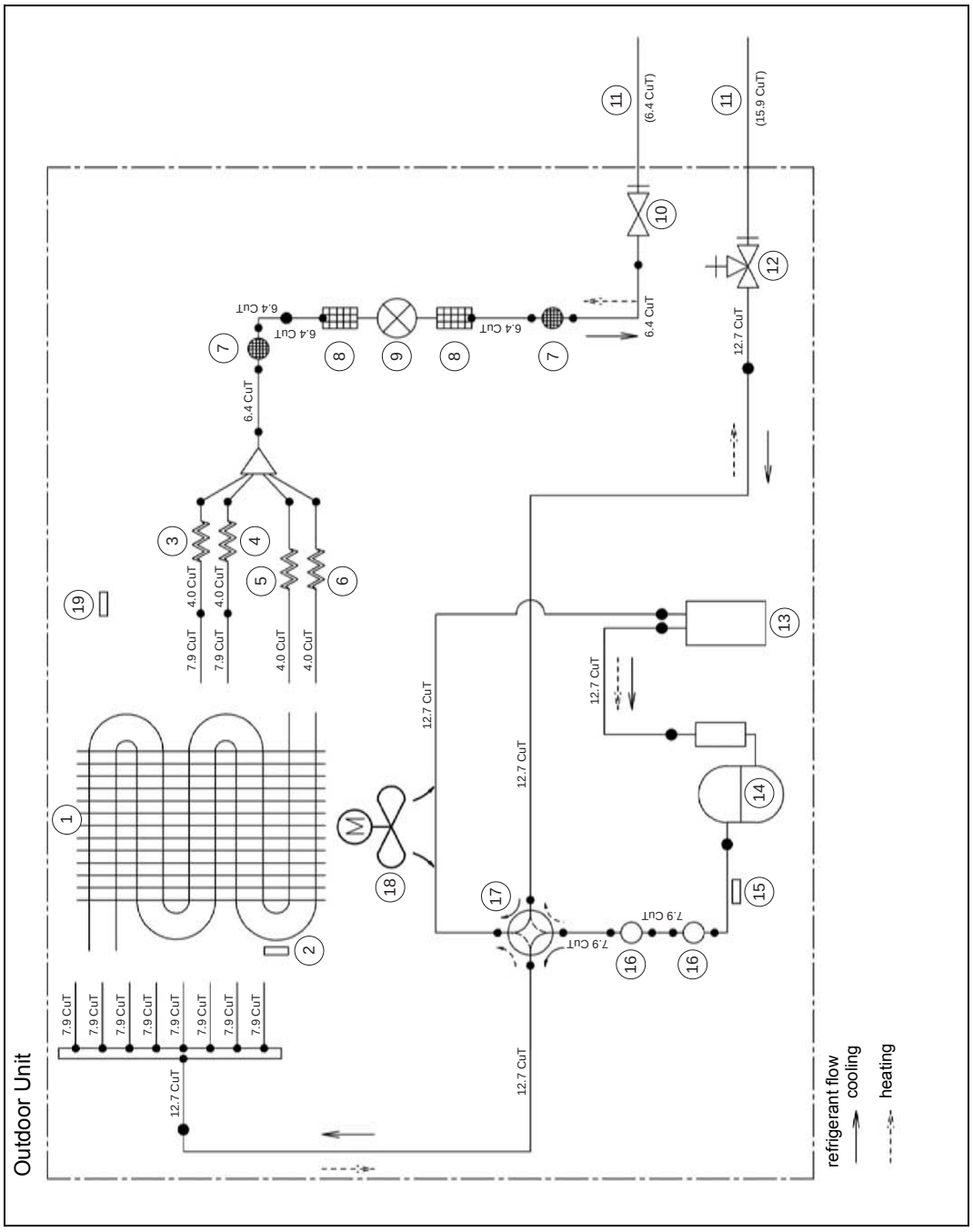
Piping diagrams

This chapter contains the following piping diagrams:

Functional diagram	See page
4.2–ERYQ005~007	1–28
4.3–EKHBH(X)	1–30

1

4.2 ERYQ005~007



Components

The table below contains the different components of the functional diagrams.

No.	Name
1	Heat exchanger
2	Heat exchanger thermistor
3	Capillary Tube 1
4	Capillary Tube 2
5	Capillary Tube 3
6	Capillary Tube 4
7	Muffler with filter
8	Filter
9	Motor operated valve
10	Liquid stop valve
11	Field piping
12	Gas stop valve with service port
13	Accumulator
14	Compressor
15	Discharge pipe thermistor
16	Muffler
17	4-way valve on: heating
18	Propeller fan
19	Outdoor air temperature thermistor

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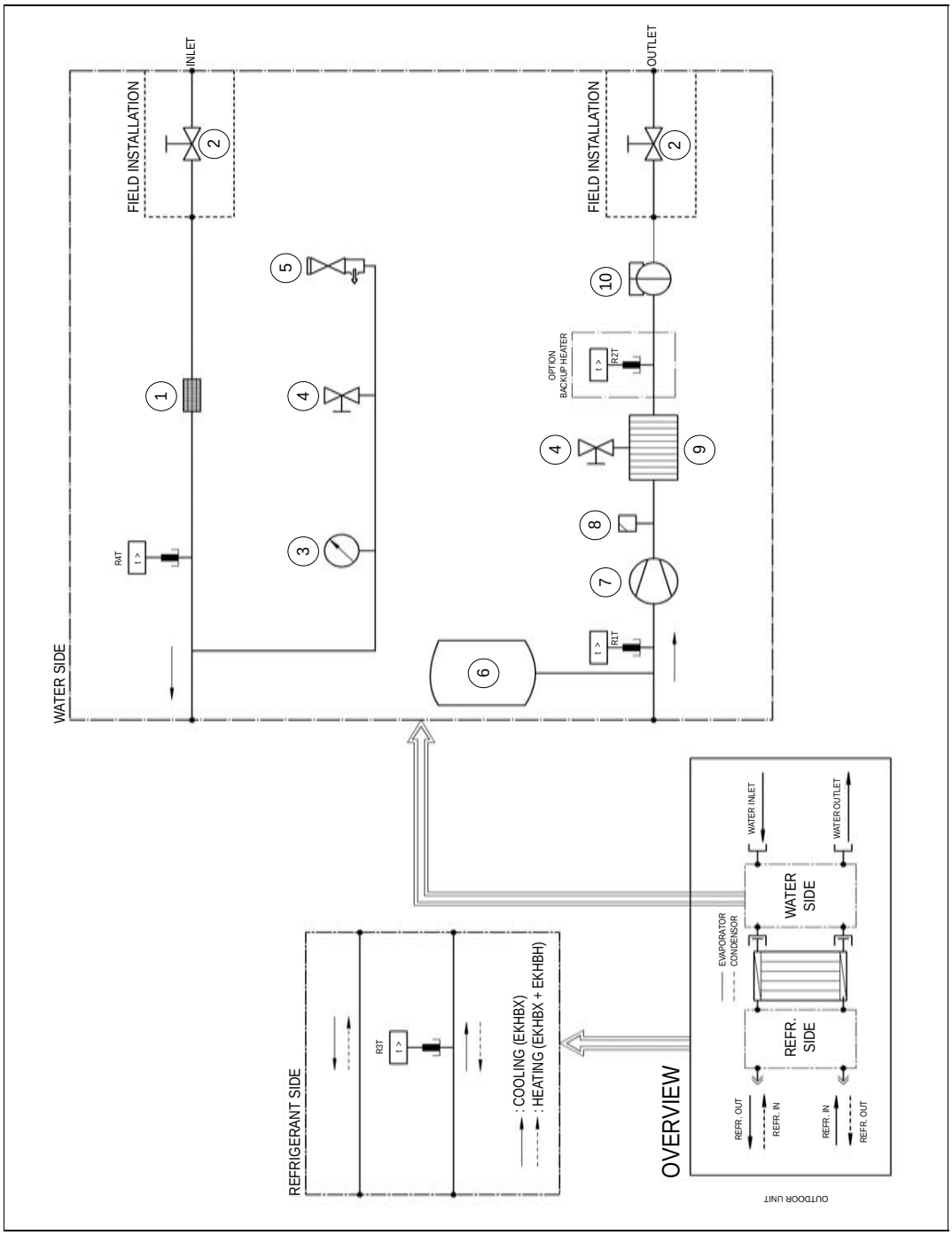
4.3 EKHBH(X)


INLET
OUTLET
FIELD INSTALLATION
FIELD INSTALLATION
WATER SIDE
OPTION BACKUP HEATER
R4T
R2T
R1T
R3T
REFRIGERANT SIDE
: COOLING (EKHBX)
: HEATING (EKHBX + EKHBH)
OVERVIEW
WATER INLET
WATER OUTLET
WATER SIDE
EVAPORATOR
CONDENSOR
REFR. SIDE
REFR. OUT
REFR. IN
REFR. IN
REFR. OUT
OUTDOOR UNIT

Components

The table below contains the different components of the functional diagrams.

No.	Name
1	Filter
2	Shut off valve
3	Pressure gauge
4	Drain valve
5	Safety valve
6	Expansion vessel
7	Pump
8	Air purge
9	Electric heater body
10	Flowswitch
R1T	Outlet water heat-exchanger thermistor
R2T	Outlet water backup heater thermistor
R3T	Refrigerant liquid side thermistor
R4T	Inlet water thermistor

1

5 Switch Box Layout

5.1 What Is in This Chapter?

Introduction

This chapter shows the switch box components.

Altherma

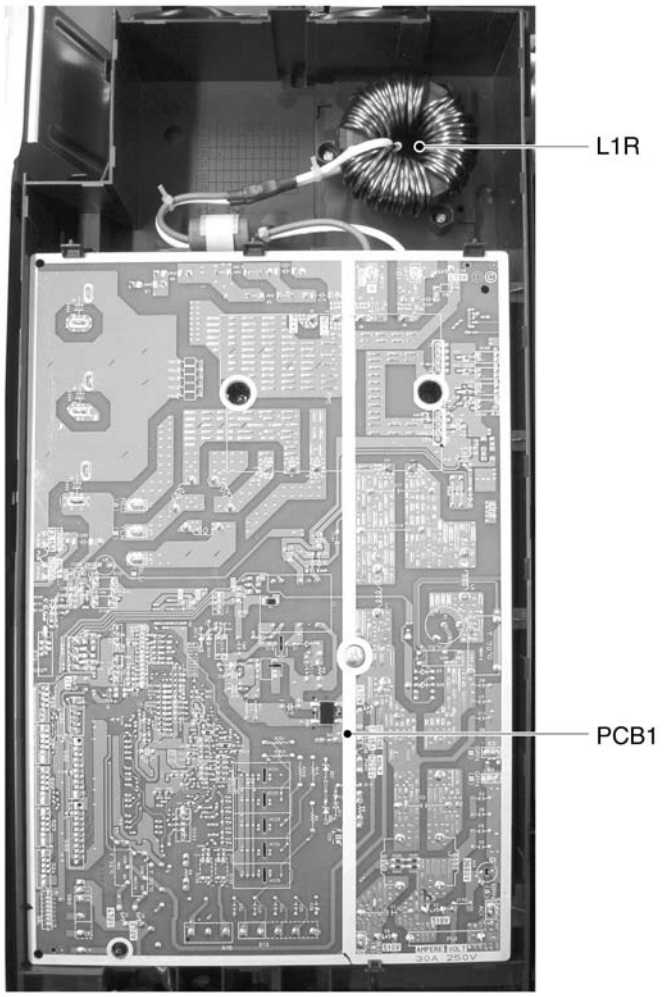
This chapter contains the following switch box layouts:

Switch box layout	See page
5.2–ERYQ005~007	1–34
5.3–EKHBH(X)005~007A***	1–36
5.4–EKSWW***V3/Z2	1–37

1

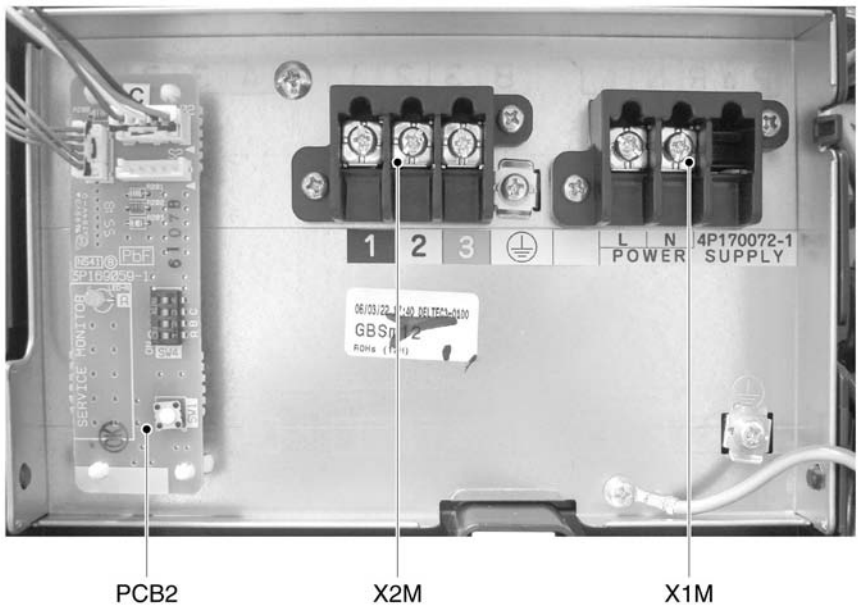
5.2 ERYQ005~007

The illustration below shows the outdoor switch box 1 layout:



Item	Description
PCB1	Printed circuit board (main)
L1R	Reactor coil

The illustration below shows the outdoor switch box 2 layout:

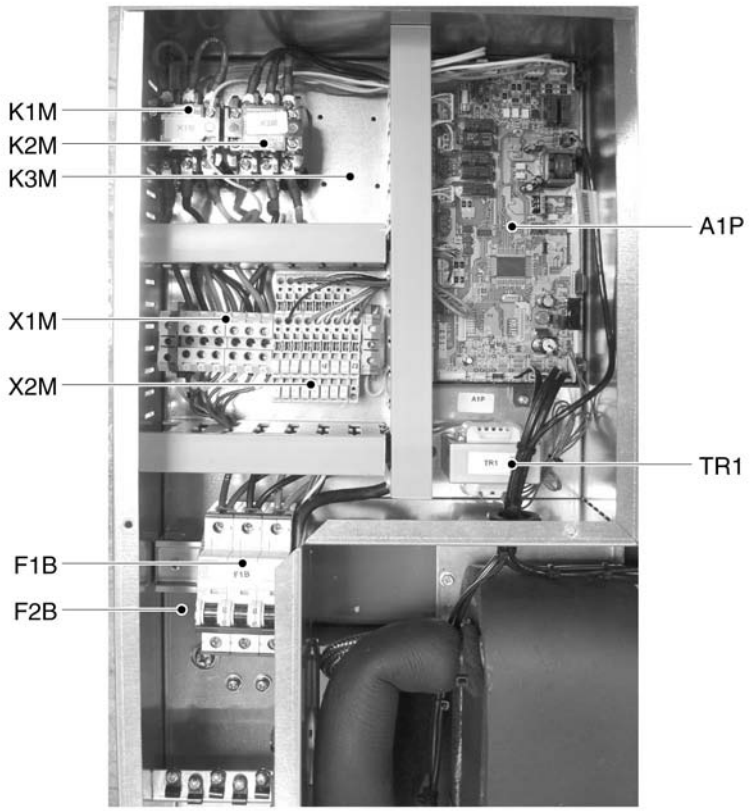


Item	Description
PCB2	Printed circuit board
X1M	Terminal strip: Power supply
X2M	Terminal strip: Communication

1

5.3 EKHBH(X)005~007A***

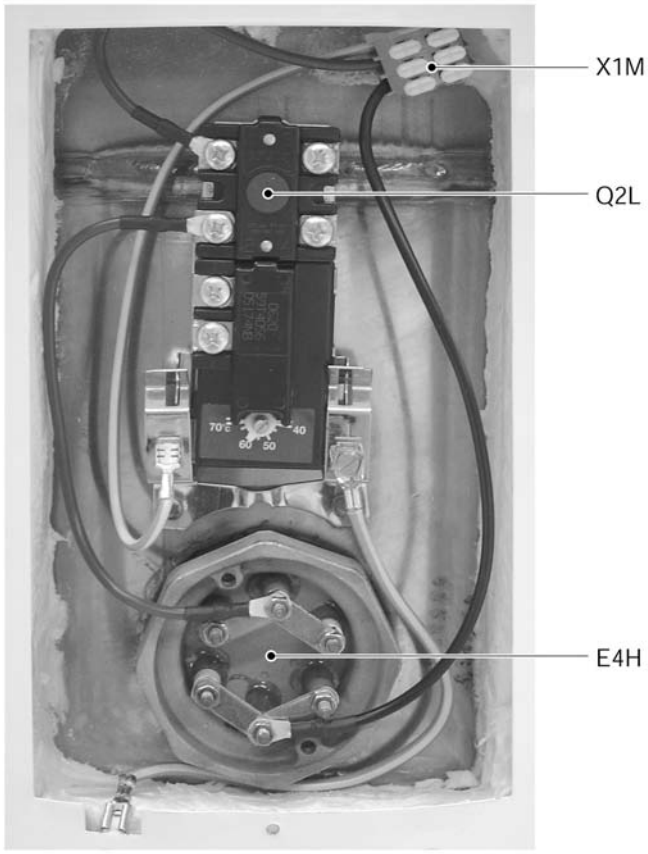
The illustration below shows the switch box layout:



Item	Description
K1M	Contactor backup heater step 1
K2M	Contactor backup heater step 2
K3M	Contactor booster heater
X1M	Terminal strip nr 1-6: power supply backup heater
X2M	Terminal strip nr 7-25: power supply & interconnection wiring
F1B	Fuse backup heater
F2B	Fuse booster heater
PCB (A1P)	Printed circuit board
TR1	Transformer (220 V/24 V)

5.4 EKSWW***V3/Z2

The illustration below shows the switch box layout:



Item	Description
X1M	Terminal strip nr 1-2: power supply booster heater
Q2L	Thermal protector booster heater: connection nr 3-4
E4H	Booster heater 3 kW 230 V (1)

(1) Remark: Internal connection of Booster heater 3 kW 400 V is slightly different.

6 Wiring Diagrams

6.1 What Is in This Chapter?

Introduction This chapter contains the wiring diagrams of the outdoor, hydro-box and sanitary water tank.

Altherma: This chapter contains the following wiring diagrams:

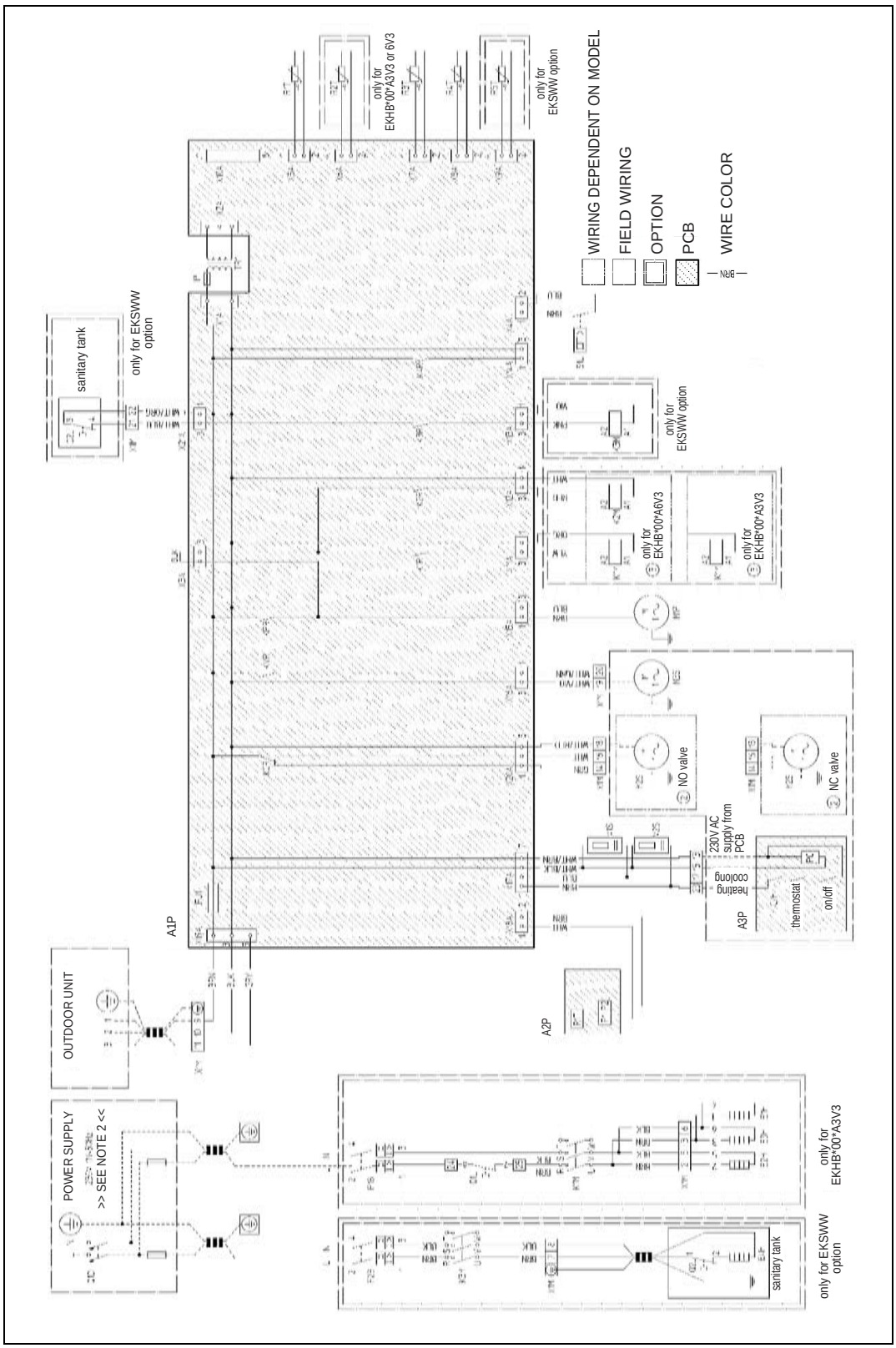
Wiring diagram	See page
6.2–EKHBH(X)005~007A3V3	1–40
6.3–EKHBH(X)005~007A6V3	1–42
6.4–EKHBH(X)005~007A6W1/A9W1	1–44
6.5–EKHBH(X)005~007A6T1/A9T1	1–46
6.6–ERYQ005~007AAV3N	1–48
6.7–EKSWW150~300V3/Z2	1–50

1

6.2 EKHBH(X)005~007A3V3

Wiring diagram EKHBH(X)005~007A3V3

The illustration below shows the wiring diagram of the unit.



A1P	Printed circuit board (Main)	M2S	2-way valve for cooling mode
A2P	Printed circuit board (Remocon)	M3S	3-way valve: floorheating/sanitary warm water
A3P	Thermostat (field supply, PC = internal power circuit)	Q1L	Thermal protector backup heater
		Q2L	Thermal protector booster heater
E1H	Backup heater element 1	Q1DI	Earth leakage protector
E2H	Backup heater element 2	R1T (A1P)	Outlet water heat exchanger thermistor
E3H	Backup heater element 3	R1T (A2P)	Thermistor (air)
E4H	Booster heater	R2T	Outlet water backup heater thermistor
F1B	Fuse backup heater	R3T	Refrigerant liquid side thermistor
F2B	Fuse booster heater	R4T	Inlet water thermistor
FU1	Fuse 3.15 A T 250 V	R5T	SWW thermistor
K1M	Contactor backup heater step 1	S1L	Flowswitch
K2M	Contactor backup heater step 2	TR1	Transformer 24 V for PCB
K3M	Contactor booster heater	V1S	Spark suppression 1
M1P	Pump	V2S	Spark suppression 2

Notes

1 This wiring diagram only applies to the hydro-box

2 Use one and same dedicated power supply for hydro-box, outdoor unit and EKSWW option.

3 Field wiring

4 Terminal strip

Connector

Terminal

Protective earth

5 Do not operate the unit by short-circuiting protection devices Q1L, Q2L, S1L

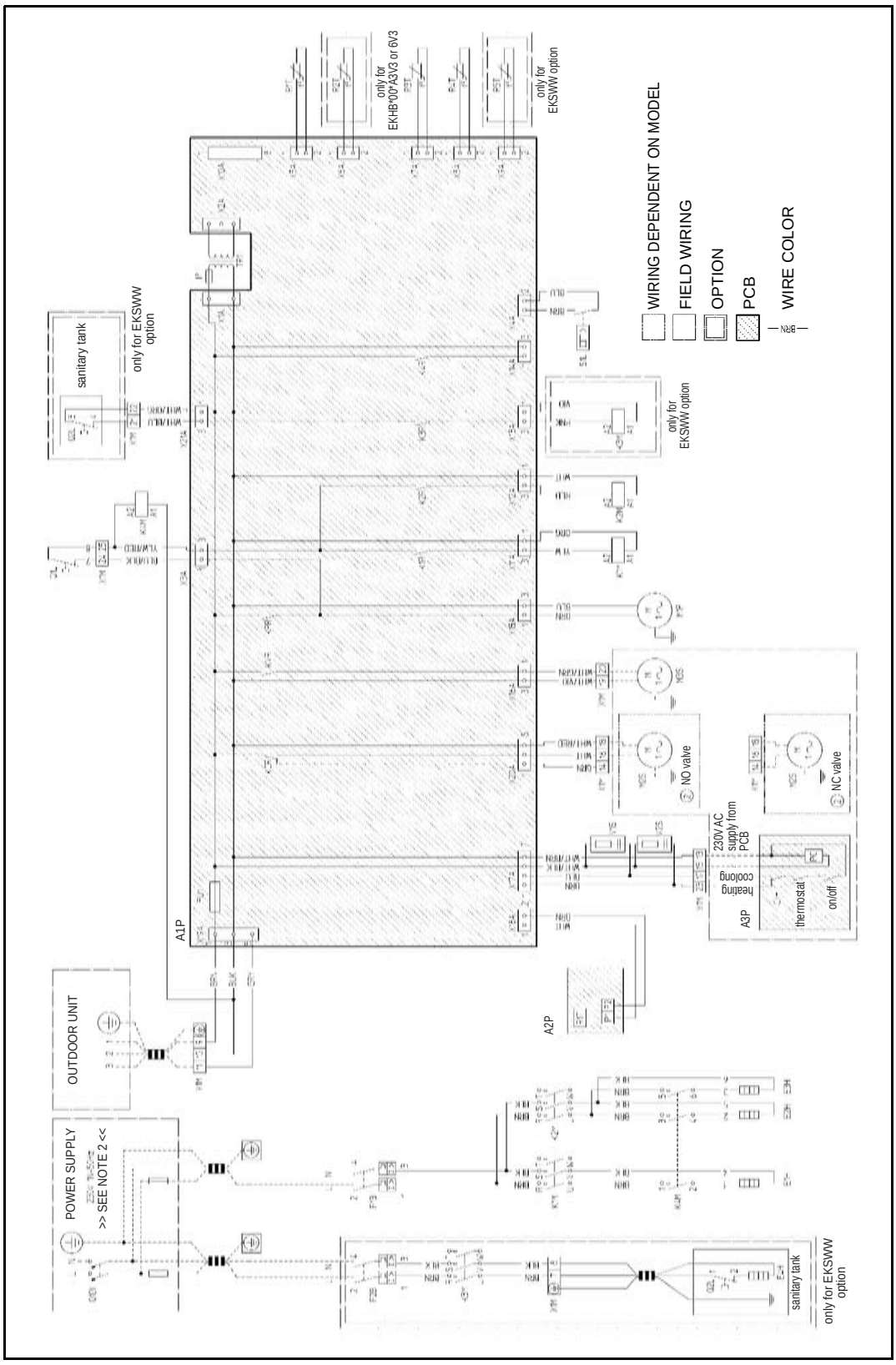
6
- ➤ BLK = BLACK
- ➤ RED = RED
- ➤ BLU = BLUE
- ➤ WHT = WHITE
- ➤ PNK = PINK
- ➤ YLW = YELLOW
- ➤ BRN = BROWN
- ➤ GRY = GREY
- ➤ GRN = GREEN
- ➤ ORG = ORANGE
- ➤ VIO = VIOLET

1

6.3 EKHBH(X)005~007A6V3

Wiring diagram EKHBH(X)005~007A6V3

The illustration below shows the wiring diagram of the unit.



A1P	Printed circuit board (Main)	M2S	2-way valve for cooling mode
A2P	Printed circuit board (Remocon)	M3S	3-way valve: floorheating/sanitary warm water
A3P	Thermostat (field supply, PC = internal power circuit)	Q1L	Thermal protector backup heater
		Q2L	Thermal protector booster heater
E1H	Backup heater element 1	Q1DI	Earth leakage protector
E2H	Backup heater element 2	R1T (A1P)	Outlet water heat exchanger thermistor
E3H	Backup heater element 3	R1T (A2P)	Thermistor (air)
E4H	Booster heater	R2T	Outlet water backup heater thermistor
F1B	Fuse backup heater	R3T	Refrigerant liquid side thermistor
F2B	Fuse booster heater	R4T	Inlet water thermistor
FU1	Fuse 3.15 A T 250 V	R5T	SWW thermistor
K1M	Contactor backup heater step 1	S1L	Flowswitch
K2M	Contactor backup heater step 2	TR1	Transformer 24 V for PCB
K3M	Contactor booster heater	V1S	Spark suppression 1
K4M	Contactor backup heater	V2S	Spark suppression 2
M1P	Pump	X1M	Terminal block

Notes

1 This wiring diagram only applies to the hydro-box

2 Use one and same dedicated power supply for hydro-box, outdoor unit and EKSWW option.

3 Field wiring

4 Terminal strip

Connector

Terminal

Protective earth

5 Do not operate the unit by short-circuiting protection devices Q1L, Q2L, S1L

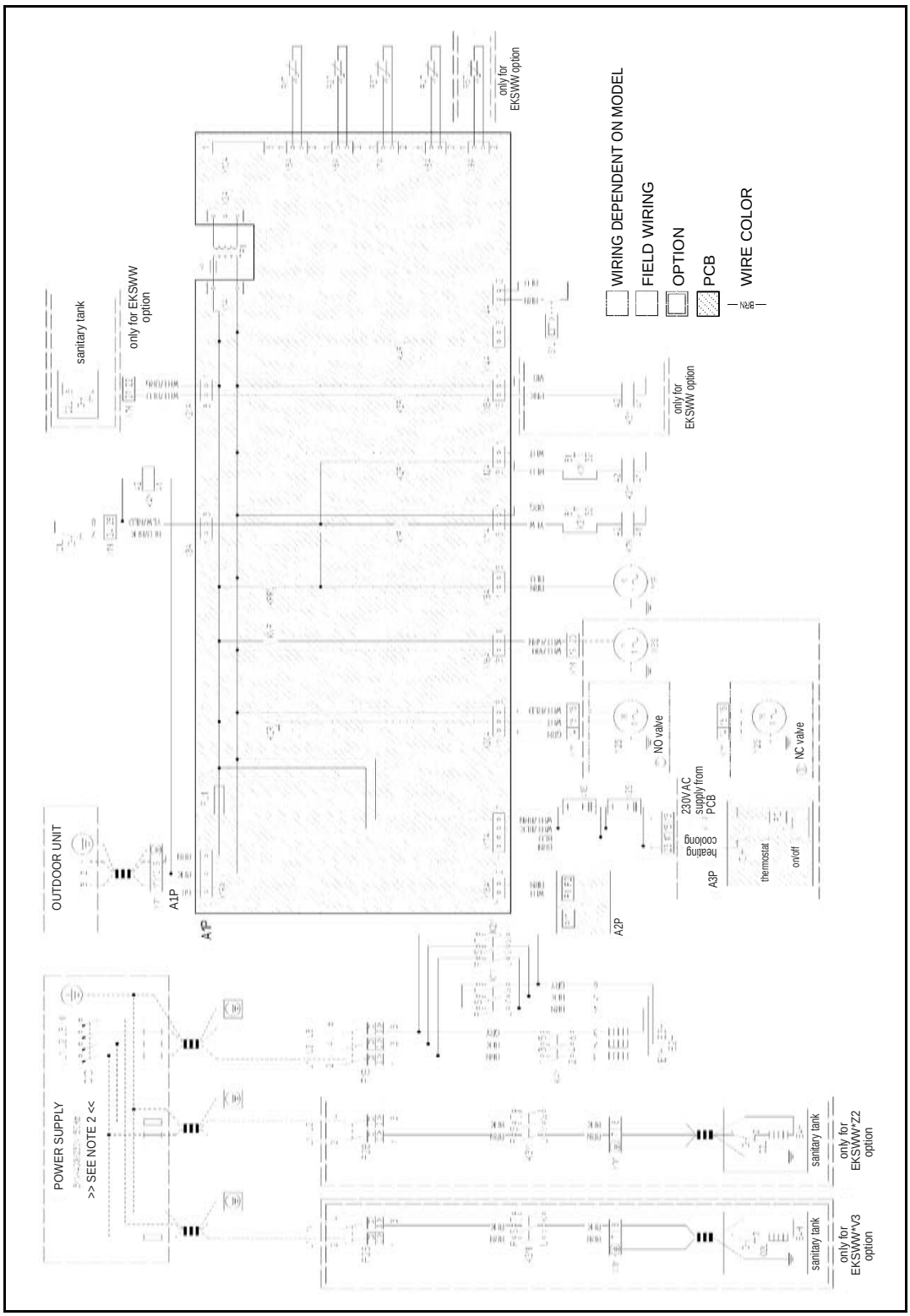
6
- ➤ BLK = BLACK
- ➤ RED = RED
- ➤ BLU = BLUE
- ➤ WHT = WHITE
- ➤ PNK = PINK
- ➤ YLW = YELLOW
- ➤ BRN = BROWN
- ➤ GRY = GREY
- ➤ GRN = GREEN
- ➤ ORG = ORANGE
- ➤ VIO = VIOLET

1

6.4 EKHBH(X)005~007A6W1/A9W1

Wiring diagram

The illustration below shows the wiring diagram of the unit.



A1P	Printed circuit board (Main)	M3S	3-way valve: floorheating/sanitary warm water
A2P	Printed circuit board (Remocon)	Q1L	Thermal protector backup heater
A3P	Thermostat (field supply)	Q2L	Thermal protector booster heater
E1H	Backup heater element 1	Q1DI	Earth leakage protector
E2H	Backup heater element 2	R1T (A1P)	Outlet water heat exchanger thermistor
E3H	Backup heater element 3	R1T (A2P)	Thermistor (air)
E4H	Booster heater	R2T	Outlet water backup heater thermistor
F1B	Fuse backup heater	R3T	Refrigerant liquid side thermistor
F2B	Fuse booster heater	R4T	Inlet water thermistor
FU1	Fuse 3.15 A T 250 V	R5T	SWW thermistor
K1M	Contactor backup heater step 1	S1L	Flowswitch
K2M	Contactor backup heater step 2	TR1	Transformer 24 V for PCB
K3M	Contactor booster heater	V1S	Spark suppression 1
K4M	Contactor backup heater	V2S	Spark suppression 2
M1P	Pump	X1M	Terminal block
M2S	2-way valve for cooling mode		

Notes

1 This wiring diagram only applies to the hydro-box

2 Use one and same dedicated power supply for hydro-box, outdoor unit and EKSWW option.

3 Field wiring

4 Terminal strip

Connector

Terminal

Protective earth

5 Do not operate the unit by short-circuiting protection devices Q1L, Q2L, S1L

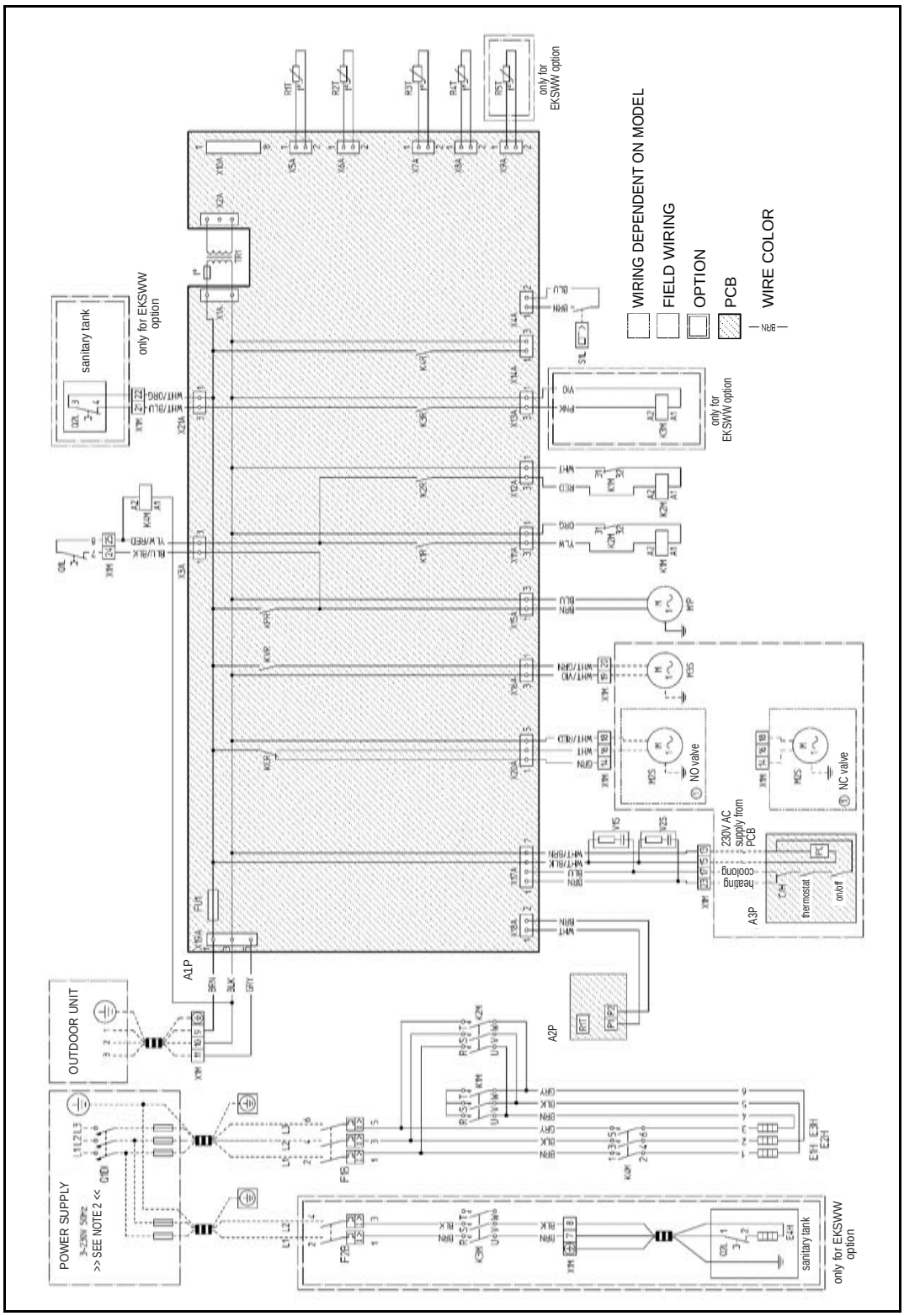
6
- ➤ BLK = BLACK
- ➤ RED = RED
- ➤ BLU = BLUE
- ➤ WHT = WHITE
- ➤ PNK = PINK
- ➤ YLW = YELLOW
- ➤ BRN = BROWN
- ➤ GRY = GREY
- ➤ GRN = GREEN
- ➤ ORG = ORANGE
- ➤ VIO = VIOLET

1

6.5 EKHBH(X)005~007A6T1/A9T1

Wiring diagram

The illustration below shows the wiring diagram of the unit.



A1P	Printed circuit board (Main)	M3S	3-way valve: floorheating/sanitary warm water
A2P	Printed circuit board (Remocon)	Q1L	Thermal protector backup heater
A3P	Thermostat (field supply)	Q2L	Thermal protector booster heater
E1H	Backup heater element 1	Q1DI	Earth leakage protector
E2H	Backup heater element 2	R1T (A1P)	Outlet water heat exchanger thermistor
E3H	Backup heater element 3	R1T (A2P)	Thermistor (air)
E4H	Booster heater	R2T	Outlet water backup heater thermistor
F1B	Fuse backup heater	R3T	Refrigerant liquid side thermistor
F2B	Fuse booster heater	R4T	Inlet water thermistor
FU1	Fuse 3.15 A T 250 V	R5T	SWW thermistor
K1M	Contactor backup heater step 1	S1L	Flowswitch
K2M	Contactor backup heater step 2	TR1	Transformer 24 V for PCB
K3M	Contactor booster heater	V1S	Spark suppression 1
K4M	Contactor backup heater	V2S	Spark suppression 2
M1P	Pump	X1M	Terminal block
M2S	2-way valve for cooling mode		

Notes

1 This wiring diagram only applies to the hydro-box

2 Use one and same dedicated power supply for hydro-box, outdoor unit and EKSWW option.

3 Field wiring

4 Terminal strip

Connector

Terminal

Protective earth

5 Do not operate the unit by short-circuiting protection devices Q1L, Q2L, S1L

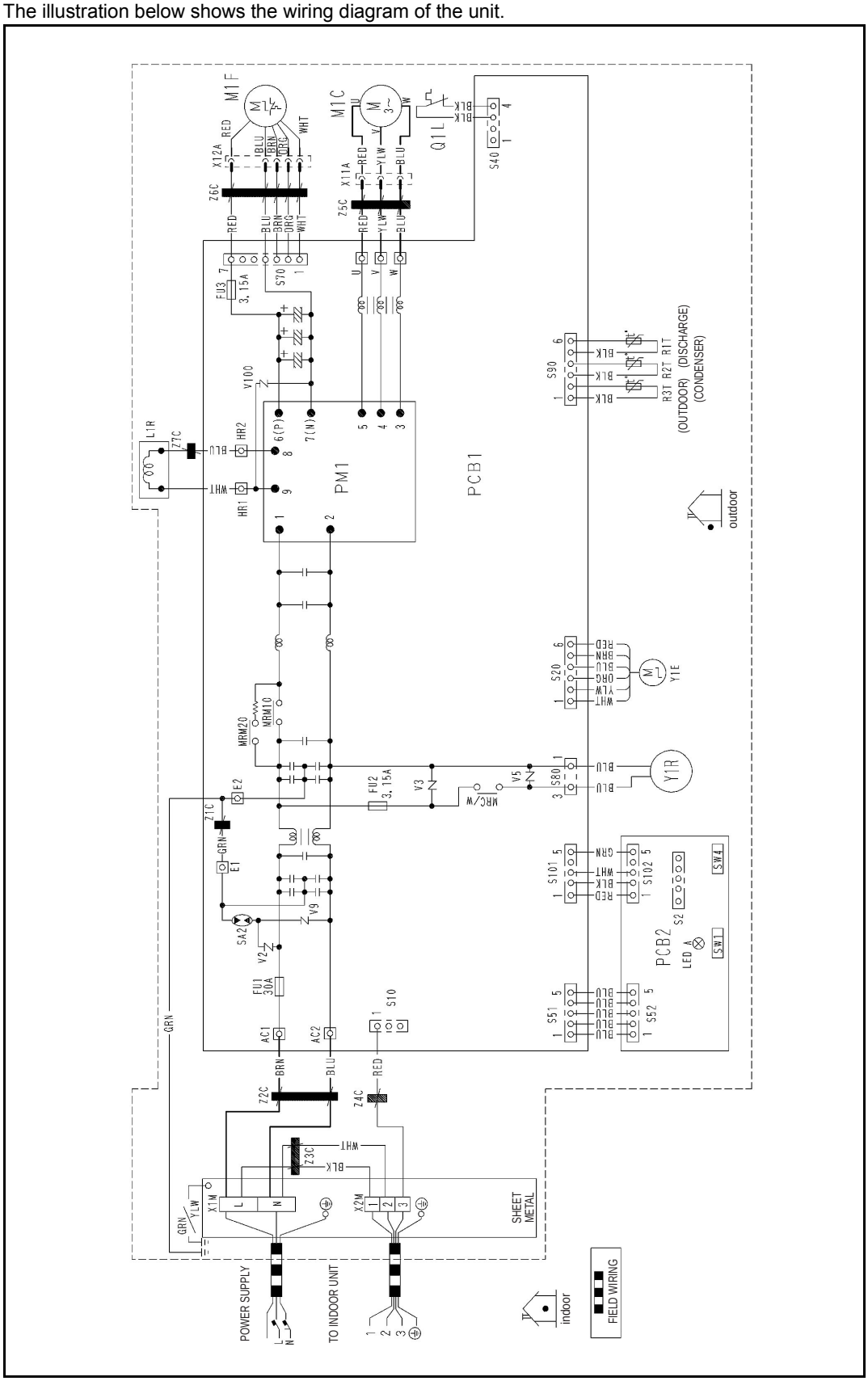
6
- ➤ BLK = BLACK
- ➤ RED = RED
- ➤ BLU = BLUE
- ➤ WHT = WHITE
- ➤ PNK = PINK
- ➤ YLW = YELLOW
- ➤ BRN = BROWN
- ➤ GRY = GREY
- ➤ GRN = GREEN
- ➤ ORG = ORANGE
- ➤ VIO = VIOLET

1

6.6 ERYQ005~007AAV3N

Wiring diagram

The illustration below shows the wiring diagram of the unit.



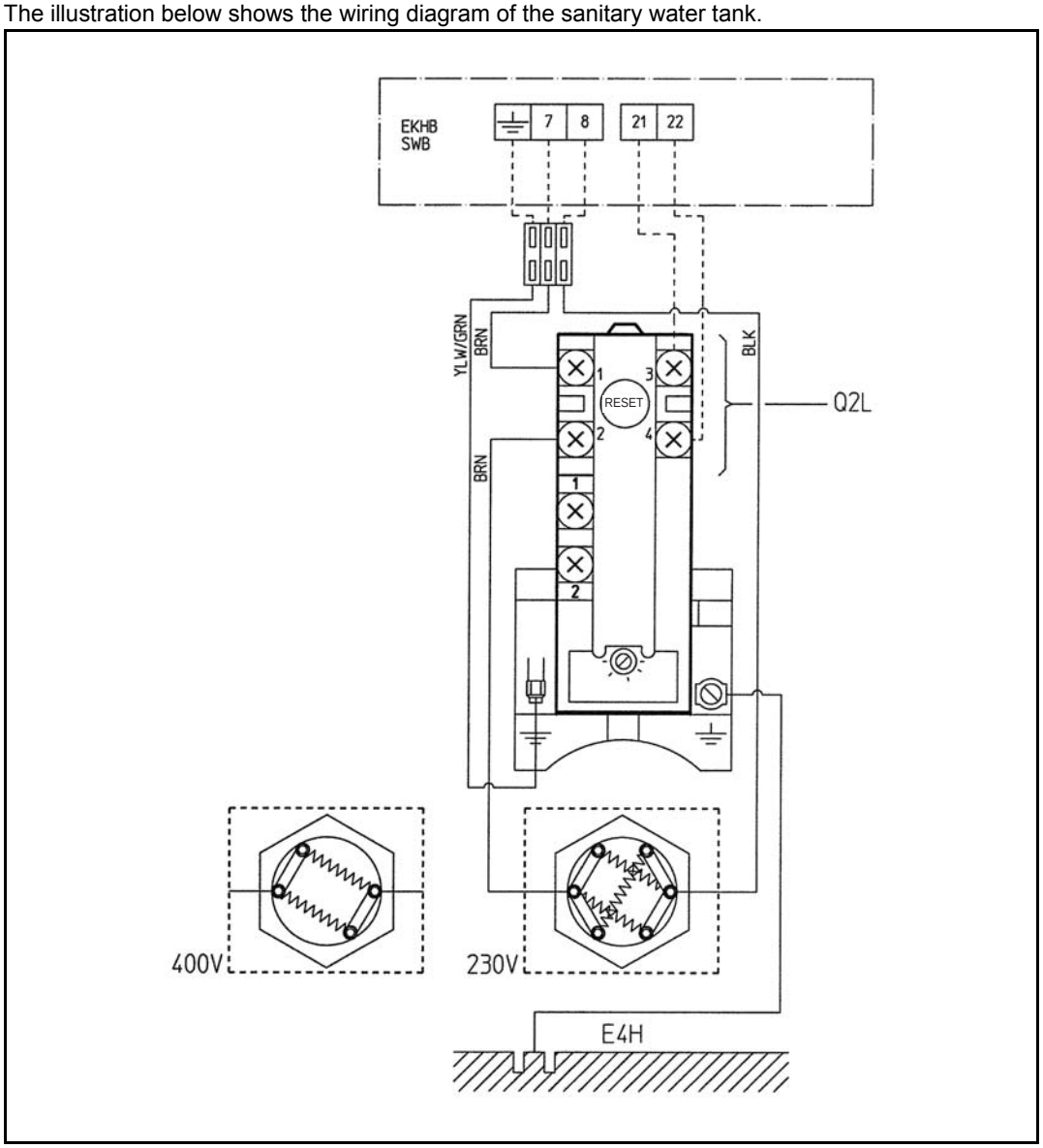
AC1, AC2, U, V, W, X11A, X12A, E1, E2, HR1, HR2	Connector	PM1	Power module
		Q1L	Overload protector
		R1T~R3T	Thermistor
FU1, FU2, FU3	Fuse	S2~S102	Connector
L	Live	SA2	Surge arrester
L1R	Reactor	Sheet metal	Terminal strip fixed plate
LEDA	Pilot lamp	SW1	Forced operation On/Off SW (SW1)
M1C	Fan motor	SW4	Local setting SW (SW4)
M1F	Fan motor	V2, V3, V5, V9, V100	Varistor
MRC/W, MRM10, MRM20	Magnetic relay	X1M, X2M	Terminal strip
		Y1E	Electronic expansion valve coil
N	Neutral	Y1R	Reversing solenoid valve coil
PCB1, PCB2	Printed circuit board	Z1C~Z7C	Ferrite core

1

6.7 EKSWW150~300V3/Z2

Wiring diagram

The illustration below shows the wiring diagram of the sanitary water tank.



7 PCB Layout

7.1 What Is in This Chapter?

Introduction

This chapter contains the following information:

- ➤ It describes which unit uses which PCB types
- ➤ It shows the PCB connectors.

Outdoor units

This chapter contains the following PCB layouts:

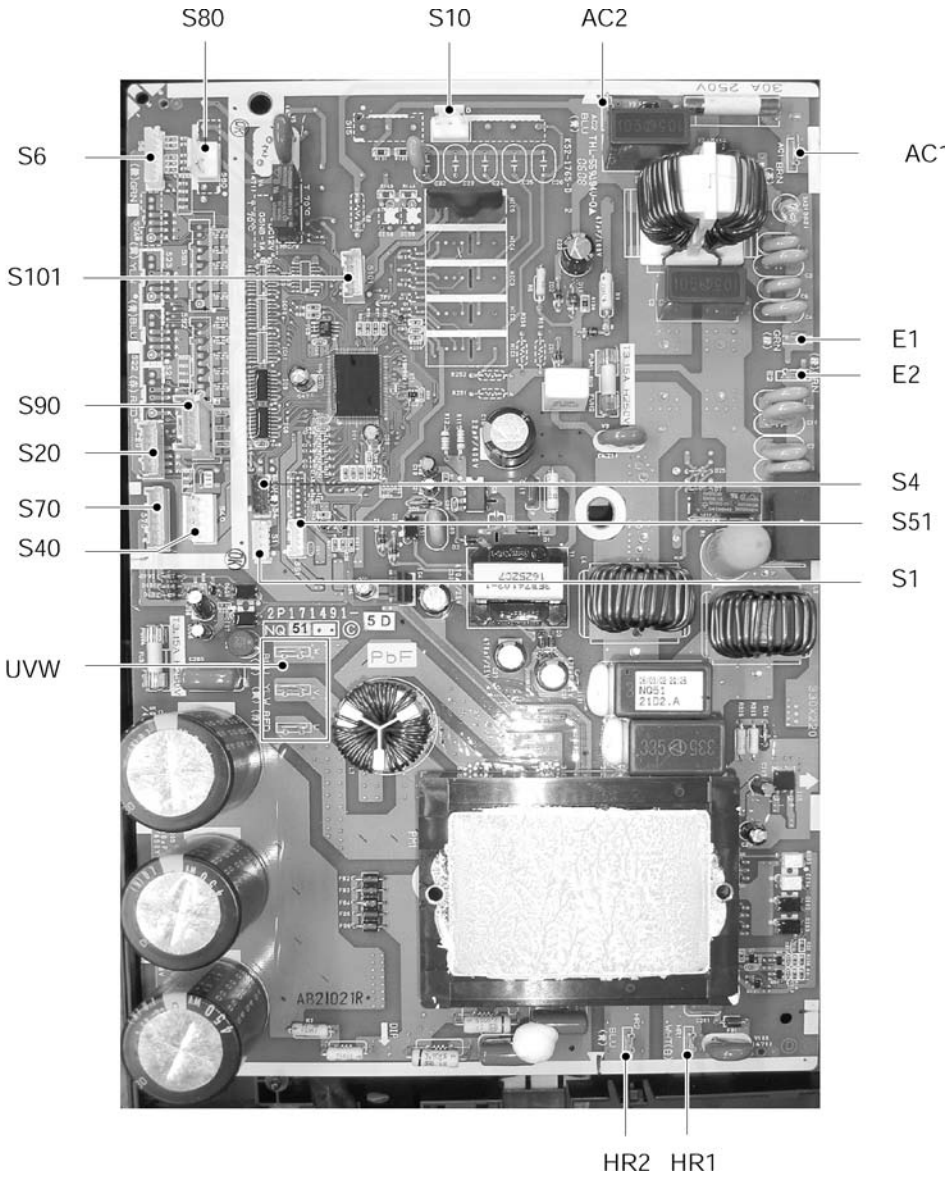
PCB layout	See page
7.2–ERYQ005~007AAV3N	1–52
7.3–EKHBH(X)	1–56

1

7.2 ERYQ005~007AAV3N

Outdoor PCB 1 (main)

The illustration below shows the PCB connectors.



Connectors

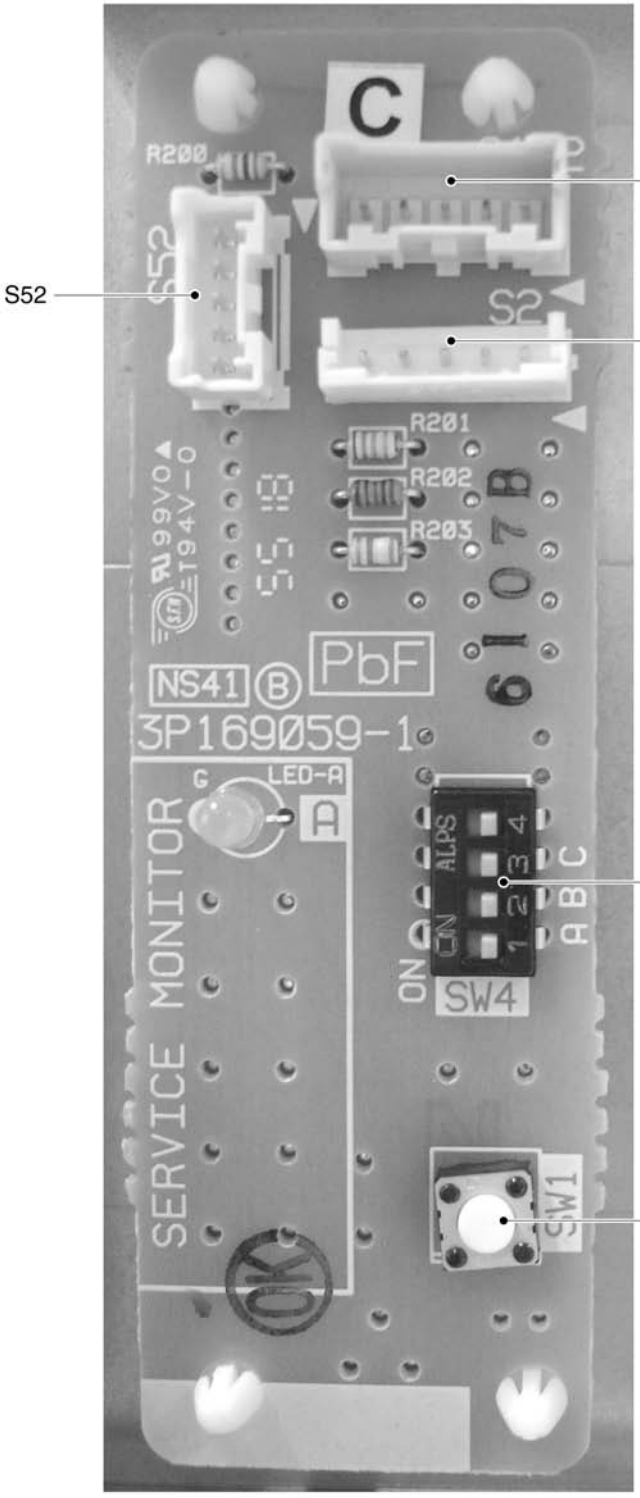
The table below describes the PCB connectors.

Connector	Connected to	Description
S1		
S4		
S6		
S10	X2M	Terminal strip: Communication
S20	Y1E	Electronic expansion valve
S40	Q1L	Overload protector
S51	PCB2 (S52)	Printed circuit board
S70	M1F	Fan motor
S80	Y1R	4-Way valve
S90	R1T	Thermistor (Discharge)
	R2T	Thermistor (Condensor)
	R3T	Thermistor (Outdoor)
S101	PCB2 (S102)	Printed circuit board
AC1	X1M	Terminal strip: Power supply
AC2		
HR1	L1R	Reactor coil
HR2		
UVW	M1C	Inverter compressor

1

Outdoor PCB 2

The illustration below shows the PCB connectors.



Connectors

The table below describes the PCB connectors.

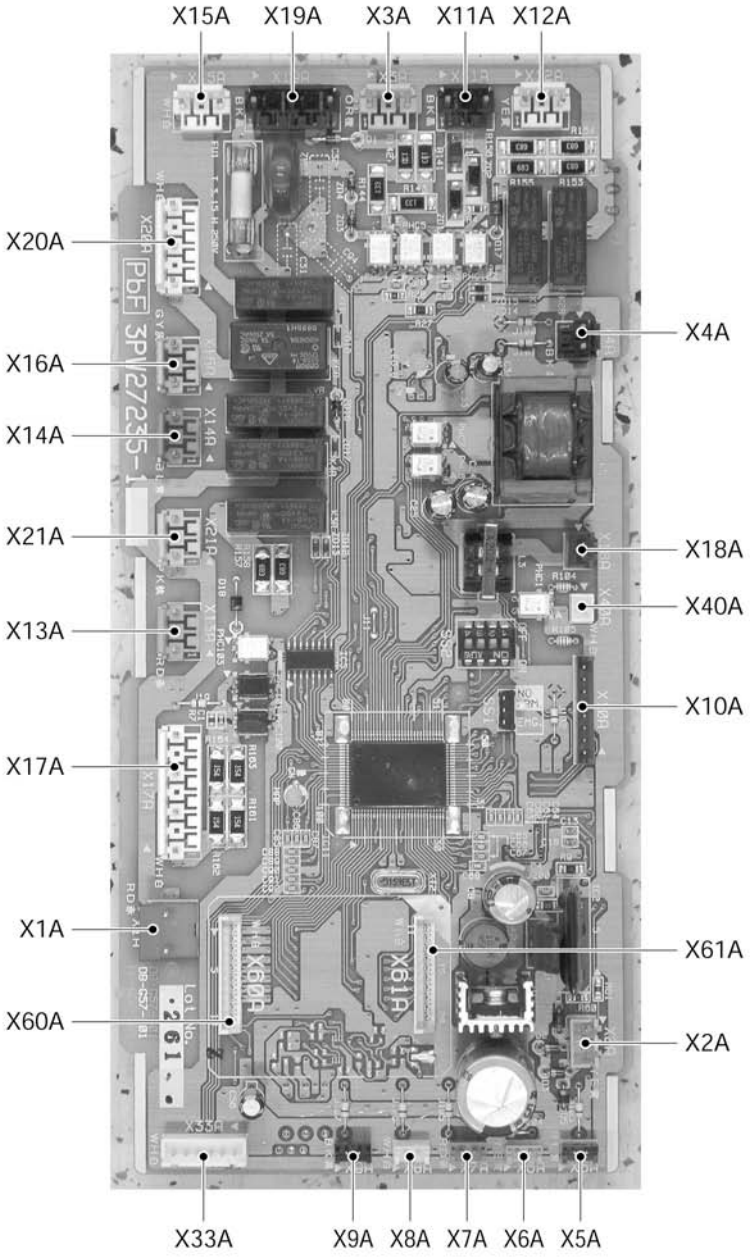
Connector	Connected to	Description
S2		Not applicable
S52	PCB 1 (S51)	Printed circuit board
S102	PCB 1 (S101)	Printed circuit board
SW1	-	Forced operation On/Off
SW4	-	Dip switch

1

7.3 EKHBH(X)

Main PCB

The illustration below shows the PCB connectors.



Connectors

The table below describes the PCB connectors for EKHBH(X).

Connector	Connected to	Terminal nr.	Description
X1A	TR1	-	Transformer (220 V/24 V)
X2A	TR1	-	Transformer (220 V/24 V)
X3A	Q1L	24-25	Thermal protector backup heater
X4A	S1L	-	Flowswitch
X5A	R1T (A1P)	-	Outlet water heat exchanger thermistor
X6A	R2T	-	Outlet water backup heater thermistor
X7A	R3T	-	Refrigerant liquid side thermistor
X8A	R4T	-	Inlet water thermistor
X9A	R5T	-	SWW thermistor (EKSWW option)
X10A	-	-	VRV checker connection
X11A	K1M	-	Contactor backup heater step 1
X12A	K2M	-	Contactor backup heater step 2
X13A	K3M	-	Contactor booster heater
X14A	-	-	Not Applicable
X15A	M1P	-	Pump
X16A	M3S	19-20	3-way valve: floorheating/sanitary warm water
X17A	PCB (A3P)	13-15-17-23	Thermostat (Field supply)
X18A	PCB (A2P)	-	Remote controler PCB
X19A	ERYQ	9-10-11	Therminal nr. 9-11: internal wiring to outdoor
X20A	M2S	14-16-18	2-way valve for cooling
X21A	Q2L	21-22	Thermal protector booster heater